

REMARKS

Applicants respectfully request reconsideration of the outstanding Office Action.

Applicants thank the Examiner for the thoughtful telephone interview of October 20, 2003. Both the obviousness-type double-patenting rejection and the art rejection(s) were discussed. No issue was reached; however, the Examiner recommended cancellation of Claim 1 in order to reduce issues.

Claim 1 is now canceled. Claims 6 and 7 have been amended to recite the term "semicrystalline" in the recitation of component (B) of the composition. This recitation finds support at page 4, lines 33-36, of the specification which states, "*it is indispensable that the copolymer (B) should be thermoplastic (that is to say, at least in the present context, semicrystalline), and nonelastomeric.*"

One problem to be solved by the present invention is to provide a polymeric composition with improved mechanical properties at low and elevated temperatures which, in the course of use, retains a flexibility and a resilience which are sufficient in the service temperature range, and which furthermore dispenses with the use of an additional plastic tape intended to prevent the sagging and with resorting to cross-linking (see page 3, lines 20-27, of the specification).

The solution provided by the present invention relates to pipes and shaped articles of particular polymer compositions based on fluoropolymers, wherein the composition comprises, by weight (Claim 6 and Claim 7):

- (A) approximately from 60 to 80% of at least one PVDF homopolymer;

- (B) approximately from 20 to 40% of at least one thermoplastic semicrystalline copolymer of VF₂ and at least one other fluoromonomer, present in this copolymer in weight proportions of approximately 5 to 25%; and
- (C) approximately from 5 to 20%, relative to the total weight of (A) and (B), of a monomeric or polymeric plasticizer.

According to the present invention, "copolymer (B) is thermoplastic (that is to say, at least in the present context, semicrystalline) and nonelastomeric" (page 4, lines 33-36, of the specification).

The rejection of claims 6-15 under the judicially created doctrine of obviousness-type double patenting over U.S. Patent 5,429,849 (Lasson et al.) in view of U.S. Patent 3,541,039 (Whiton).

Applicants respectfully traverse the double-patenting rejection of Claims 6-15 under the judicially created doctrine of obviousness-type double patenting over Lasson et al. in view of Whiton for the following reasons:

In Lasson et al., the problem is to provide polymer compositions based on PVDF homopolymers with improved thermomechanical properties which, furthermore, dispense with the use of a plasticizer (column 2, lines 18-22).

The classic test(s) for double patenting are akin to the determination of infringement. Cf. *In re Vogel*, 164 U.S.P.Q. 619 (C.C.P.A. 1970). The *Vogel* determination requires an element by element determination of one set of claims against the other set of claims. In the specific fact situation set up by the rejection, an article infringing the claims of the 5,429,849 reference, which requires two components, does not infringe the claims of the instant application. An

article which infringes the claims of the above-identified application and which requires greater than 75% of element (A) does not literally infringe the claims of the Lasson reference. Accordingly, in Applicants' view, a re-visiting of the substance of the issue is required.

Lasson et al. teaches polymer composition comprising, by weight:

- (a) from 25 to 75% of PVDF homopolymer;
- (b) from 25 to 75% of a thermoplastic copolymer of VF₂ and at least one other fluoromonomer, exhibiting a content of 5 to 25% of this other monomer, wherein the fluoromonomer is selected from the group consisting of hexafluoropropylene, chlorotrifluoroethylene and trifluoroethylene.

Lasson et al. indicates that, by virtue of the incorporation of the thermoplastic copolymer (b) in the homopolymer (a), according to the invention, the compositions and, hence, the cables, pipes, or other articles which will be made therefrom, are provided with a permanent plasticization effect and a wide range of use temperatures (column 2, lines 65 and ss).

Lasson et al. describes that, to this end, it is essential that the copolymer (b) should be thermoplastic, that is to say, at least in the context of the concerned patent, semi-crystalline. In particular, Lasson et al. does not suggest a pipe, including at least one layer or shaped article consisting of a composition such as the one of the present invention, comprising approximately from 5 to 20%, relative to the total weight of PVDF homopolymer (A) and VF₂ copolymer (B), of a monomeric or polymeric plasticizer. Contrary thereto, Lasson et al. clearly teaches away from adding a plasticizer in the PVDF homopolymer/VF₂ copolymer composition.

In Whiton, the problem is to provide compositions of crystalline polymeric vinylidene fluoride plasticized with a suitable plasticizer for such crystalline polymer (column 2, lines 22-28) and not for non-crystalline or partially crystalline polymer such as those of the prior art (column 2, lines 58-62).

The crystalline polymers of vinylidene fluoride which concern Whiton are those containing more than 95% of vinylidene fluoride, particularly those selected from the group consisting of a crystalline homopolymer of vinylidene fluoride and of a crystalline copolymer formed by copolymerizing vinylidene fluoride with less than 5 mol percent of a haloethene, *e.g.*, chlorotrifluoroethylene, tetrafluoroethylene, dichlorodifluoroethylene, and trifluoroethylene (column 3, lines 8-15).

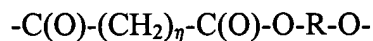
Whiton teaches that the crystalline polymeric vinylidene fluoride is plasticized with minor amounts of linear saturated polymeric polyester having a molecular weight of below about 5,000 to form compositions having high flexibility and workability in sheet, film rod, or tubing form (column 3, lines 8-28).

In particular, Whiton *et al.* does not suggest a pipe, including at least one layer consisting of or shaped article consisting of a composition such as the one of the above-mentioned patent applications, comprising a thermoplastic copolymer of VF_2 , and at least one other fluoromonomer, present in this copolymer in weight proportions of at least 5%, which is semi-crystalline (see page 4, lines 33-36, of the specification).

In summary, the record provides neither suggestion nor motivation for one skilled in the art to combine Lasson *et al.*, who teaches away from adding a plasticizer to a composition based

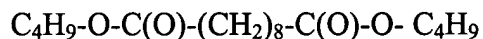
on semi-crystalline VF₂ polymer, with Whiton, who teaches the addition of particular plasticizers to a composition of crystalline VF₂ polymers, in order to solve the problem of the present invention.

It is Applicants' opinion that present Claims 6-15 cannot be rejected under the judicially created doctrine of obviousness-type double patenting over Lasson *et al.* in view of Whiton. Moreover, Applicants request reconsideration with respect to the material recited in Claims 10 and 14 (dibutylsebacate), since Whiton teaches as plasticizers linear saturated polymeric polyesters consisting essentially of recurring units of the formula:



in which η is an integer from 4 to 8 inclusively, and R is an alkene group having from 4 to 7 carbon atoms, inclusively (column 3, lines 19-28), said polyester having a molecular weight from about 1,100 to about 5,000 and boiling points above about 400°C (column 3, lines 49-52). According to Whiton, said polyesters can be prepared from glycols and dihydric acids (column 3, lines 31-33).

By comparison, that dibutylsebacate is monomeric diester, whose formula is



(see page 6, line 24, of the present application) obtainable by reaction between sebacic acid and butanol (and not a diol), and having a molecular weight of 314.5 and a boiling point of 344-345°C. Therefore, Whiton does not dictate or suggest monomeric plasticizers including dibutyl sebacate, as recited in claims 10 and 14 of the present invention. Accordingly, there is clearly no

obviousness-type double-patenting rejection against Claims 10 and 14 based on the combination of Lasson (5,429,849) and Whiton.

**Rejection of Claims 7-15 Under 35 U.S.C. § 103(a) Over
U.S. Patent 4,200,568 (Trautvetter et al.) In View of U.S.
Patent 3,541,039 (Whitton).**

Applicants respectfully traverse the rejection of Claims 7-15 under 35 U.S.C. 103(a) over Trautvetter et al. in view of Whiton for the reasons detailed hereafter.

Trautvetter et al. (BE 832,851), cited on page 3, lines 8-19, of the present application, describes a composition comprising a polyvinylidene fluoride and a fluoroelastomer, especially a fluoroelastomer containing moieties of vinylidene fluoride and hexa- or pentafluoropropylene, such as in an amount between 1 and 30% by weight of the PVDF (column 1, lines 61-67). Trautvetter et al. teaches fluoroelastomers including copolymers of (column 2, lines 64-67):

- (A) from 75 to 85 mole percent of vinylidene fluoride; and
- (B) from 15 to 25 mole percent of hexafluoropropylene or pentafluoropropylene or a mixture thereof;

or terpolymers of (column 3, lines 1-4):

- (A) from 50 to 80 mole percent of vinylidene fluoride;
- (B) from 15 to 25 mole percent of hexa- or pentafluoropropylene; and
- (C) from 5 to 25 mole percent of tetrafluoroethylene.

For the PVDF-elastomeric fluoro-copolymer mixtures, as dictated by Trautvetter et al., in order to give them high resilience and elongation at break, coupled with desirable thermal stability and

tensile strength, it is strongly recommended to cross-link the elastomer (column 2, lines 20-26) and optionally to post-cure the articles thus produced (column 4, lines 15-19).

In particular, this reference does not suggest a pipe, including at least one layer or a shaped article consisting of a composition such as the one of the present invention, comprising a thermoplastic semicrystalline copolymer of VF_2 and at least one other fluoromonomer, present in this copolymer in weight proportions of approximately 5 to 25%.

The Examiner's attention is respectfully directed to the fact that, according to the present invention, "it is indispensable that copolymer (B) should be thermoplastic (that is to say, at least in the present context, semicrystalline) and nonelastomeric" (page 4, lines 33-36).

Trautvetter et al. warns against the use of internal or external plasticizer, as it teaches that "when a plasticizer is added to a polyvinylidene fluoride composition, there is observed the impairment of other properties, such as tensile strength, thermal stability of shape or chemical resistance" (column 1, lines 38-42). Thus, it is not logical to combine the descriptions of Trautvetter et al. with Whiton. Logical reading of Trautvetter et al. would suggest elimination of the plasticizer; however, Whiton requires plasticizer with crystalline polymeric vinylidene fluoride.

Applicants submit that the record provides no evidence of either suggestion or motivation for one skilled in the art to combine Trautvetter, who describes a composition comprising a fluoroelastomer and warns against the use of a plasticizer, with Whiton, who teaches the addition of particular plasticizers to a composition of crystalline VF_2 polymers, in order to solve

the problem of the present invention. In a factual sense, the combination does not include a semi-crystalline polymer.

In summary, (a) there is no teaching and the PTO has presented no rationale to combine the references (b) to arrive at the present invention; and (c) there is no teaching in the references that would lead one to expect the superior properties demonstrated by the invention.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Thus, Applicants respectfully traverse the rejection of Claims 6-15 as obvious in view of Trautvetter et al. in combination with Whiton, under 35 U.S.C. 103(a).

Further, with regard to the material recited in Claims 10 and 14 (dibutylsebacate) of the present application, as explained previously, Whiton teaches plasticizers of linear saturated polymeric polyesters obtainable from diols and dihydric acids having a molecular weight of from about 1,100 to about 5,000 and boiling points above about 400°C. Therefore, Whiton does not describe or suggest monomeric plasticizers including dibutyl sebacate, obtainable by the reaction between sebacic acid and butanol (and not a diol) having a molecular weight of 314.5 and a boiling point of 344-345°C, as recited in claims 10 and 14 of the present invention.

In view of this, Applicants submit that Claims 10 and 14 are not obvious in view of Trautvetter et al. in combination with Whiton, and cannot, therefore, be rejected under 35 U.S.C. 103(a) in view of those documents.

**Applicants Respectfully Traverse the Rejection of Claims 6-11
Under 35 U.S.C. § 103(a) Over EP 0 166 385 A2 (Sademitsu et
al.) in View of U.S. Patent 4,200,568 (Trautvetter et al.) and
U.S. Patent 3,541,039 (Whiton).**

Sademitsu et al. (EP166,385 A2), cited on page 2, lines 29-36, of the present application, describes a multi-layer pipe comprising, *inter alia*, a spiral-wound steel tape and an adjacent layer consisting of a polymeric composition of specified properties based on a PVDF copolymer. Such PVDF copolymer composition is selected from the group consisting of (claim 1):

1. polyvinylidene fluoride copolymer resins;
2. blends thereof with polyvinyl fluoride resins;
3. compositions based on the polyvinylidene fluoride copolymer resins.

Regardless of a PVDF copolymer-based exact composition, generically, defined as above, compositions of choice should comply with specified requirements in terms of impact resistance and tensile strength (page 3, lines 29-35). A copolymer obtained from VF₂ containing from 5 to 10% (molar) of hexafluoropropylene is recommended, due to its good physical properties (page 5, lines 18-21).

Contrary to the present invention, Sademitsu et al. does not suggest a pipe, including at least one layer consisting of a composition comprising a well-defined quantity of approximately from 60 to 80% of at least one PVDF homopolymer, and a well-defined quantity of

approximately from 20 to 40% of at least one thermoplastic copolymer of VF₂, and at least one other fluoromonomer present in this copolymer in weight proportions of approximately 5 to 25%. Further, contrary to the present invention, Sademitsu et al. does not suggest a pipe, including at least one layer consisting of a composition comprising a monomeric or polymeric plasticizer in a quantity of approximately from 5 to 20% relative to the total weight of the polymers.

As recognized by the Examiner, Sademitsu et al. does not disclose a shaped article, including at least one layer consisting of a composition such as the composition according to the present invention.

Trautvetter et al. (BE 832,851), cited at page 3, lines 8-19, of the present application, teaches formed articles having improved mechanical properties obtained from compositions comprising a polyvinylidene fluoride and a fluoroelastomer, especially a fluoroelastomer containing moieties of vinylidene fluoride and hexa- or pentafluoropropylene, in an amount of between 1 and 30% by weight of the PVDF. As explained above, according to the invention, "it is indispensable that copolymer (B) should be thermoplastic (that is to say, at least in the present context, semicrystalline) and nonelastomeric" (page 4, lines 33-36, of the present patent application).

Contrary to the present invention, Trautvetter et al. does not suggest the presence of a thermoplastic semicrystalline copolymer of vinylidene fluoride in the composition used to form one layer of the shaped article. Further, Trautvetter et al. warns against the use of an internal or external plasticizer, as it teaches that "when a plasticizer is added to a polyvinylidene fluoride

composition there is observed the impairment of other properties, such as tensile strength, thermal stability of shape or chemical resistance" (column 1, lines 38-42). Trautvetter *et al.* thus clearly teaches away from adding a plasticizer in the polymer composition.

Therefore, it would not be obvious for one of ordinary skill in the art at the time of Applicants' invention, in view of Sademitsu *et al.* in combination with Trautvetter *et al.*, to obtain a pipe or a shaped article including at least one layer of a composition comprising:

- (A) approximately from 60 to 80% of at least one PVDF homopolymer;
- (B) approximately from 20 to 40% of at least one thermoplastic copolymer of VF₂ and at least one other fluoromonomer, present in this copolymer in weight proportions of approximately 5 to 25%; and
- (C) approximately from 5 to 20%, relative to the total weight of (A) and (B), of a monomeric or polymeric plasticizer.

Whiton teaches that crystalline polymeric vinylidene fluoride is plasticized with minor amounts of linear saturated polymeric polyester having a molecular weight of below about 5,000 to form compositions having high flexibility and workability in sheet, film rod, or tubing form (column 3, lines 8-28). As explained in a previous paragraph (see ITEM 3), the problem in Whiton is to provide compositions of crystalline polymeric vinylidene fluoride plasticized with a suitable plasticizer for such crystalline polymer (column 2, lines 22-28) and not for non-crystalline or partial crystalline polymers, such as those of the prior art (column 2, lines 58-62).

Trautvetter et al. warns against the use of internal or external plasticizer in the polyvinylidene fluoride composition and thus clearly teaches away from adding a plasticizer in the polymer composition.

In Applicants' view, there was neither suggestion nor motivation for one skilled in the art to combine Trautvetter et al., who describes a composition comprising a fluoroelastomer and who warns against the use of a plasticizer, with Whiton, who teaches the addition of particular plasticizers to a composition of crystalline VF₂ polymers.

A fortiori, the object of the present invention is not obvious in view of the combination of Sademitsu et al., who teaches PVDF compositions having defined mechanical properties, with Trautvetter et al. and Whiton. In view of this, Applicants are of the opinion that Claims 6-11 are not obvious in view of Sademitsu et al., in combination with Trautvetter et al. and Whiton, and cannot, therefore, be rejected under 35 U.S.C. 103(a) in view of these references.

Further, with regard to the material recited in Claim 10 (dibutylsebacate) of the above-mentioned application, as explained in a previous paragraph, Whiton teaches plasticizers linear saturated polymeric polyesters obtainable from diols and dihydric acids having a molecular weight of from about 1,100 to about 5,000 and boiling points above about 400°C. Therefore, Whiton does not indicate or suggest monomeric plasticizers including dibutyl sebacate, obtainable by the reaction between sebacic acid and butanol (and not a diol) having a molecular weight of 314.5 and a boiling point of 344-345°C, as recited in Claim 10 of the present invention.

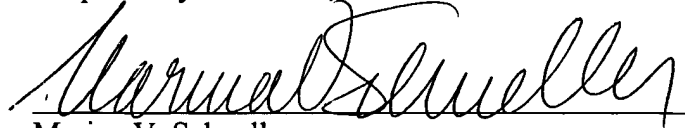
In Applicants' opinion, Claims 10 and 14 are not obvious in view of Sademitsu *et al.*, in combination with Trautvetter *et al.* and Whiton, and can not, therefore, be rejected under 35 U.S.C. 103(a) in view of these references.

**U.S. Patent 4,094,949 (Yokokawa *et al.*) Is Alleged To
Be Pertinent Prior Art to Applicants' Disclosure.**

Yokokawa *et al.* teaches a method for preparing heat-shrinkable articles from a resin blend of a fluorinated elastomer and a PVDF resin. The addition of a curing catalyst to the resin blend is required before shaping the blend into an article, with heating the elastomer to cure (column 2, lines 7-17). Thus, Yokokawa *et al.* fails to disclose shaped articles or pipes including at least one layer consisting of a blend of PVDF homopolymer, a thermoplastic semicrystalline non-elastomeric VF₂ copolymer and a plasticizer, such as those claimed in the subject patent application.

Our general conclusion is that the pipes or shaped articles of the present invention are novel and not obvious over the prior art.

Respectfully submitted,



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